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ABSTRACT

Follow Through is a longitudinal program instituted by the U.S. Office of Education in which a variety of curriculum models have been implemented in a number of locations nationwide. Because services are provided from kindergarten through third grade, many children enter and leave the program at points not coterminous with the treatment itself. The purpose of this study was to assess the effects of attrition on the national Follow Through evaluation. Relationships between child characteristics such as ethnicity, sex, family income, and mother's education and attrition group membership were investigated to determine whether the findings of the major analysis should be qualified. (Author)

THE EFFECTS OF ATTRITION ON THE NATIONAL EVALUATION OF FOLLOW THROUGH

by

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One of the most important problems that is germane to the topic of social experimentation, educational evaluations, and especially to longitudinal studies is the issue of attrition, that is, the loss of units from a study. In a critique of educational evaluation studies including Sesame Street, Head Start, and Follow Through, Anderson (1973) suggested that additional information as to the nature of these programs be provided to assist the reader in interpreting the major conclusions. Such information, which has largely been omitted in the past, should include "...provision of data on dropouts in groups of subjects. (Failure to take account of differences in the number and kinds of dropouts in groups that are to be compared represents a major source of error in conclusions about the effects of educational treatments.)" (Anderson, 1973, p. 202).

While the significance of attrition problems was popularized by Campbell and Stanley (1963) in their identification of attrition as a "possible rival hypothesis," later work by Jurs and Glass (1970) revealed that mortality estimates are seldom given in reports of educational studies, and that virtually no textbooks include attrition as a topic of interest. Although Kershaw (1971) gives suggestions for countering attrition in interview situations, and Riecken and Boruch (1975) as well as Jurs and Glass (1970) discuss various aspects of the attrition problem, it is clear from a review of educational studies that investigations of the effects of attrition on either the internal or external validity of educational studies are usually lacking.

Our general interest in attrition stems in part from the observation that the infrequency of attention to attrition exacerbates problems of data interpretation. We are concerned that the lack of a clear understanding of the causes and effects of attrition will inhibit the development of better evaluation technology and will obscure the identification of valuable educational and social programs.

The purpose of the present study is to ascertain if the composition of the treatment and control groups in one large-scale longitudinal program, Follow Through, has changed differentially as a result of attrition.

Follow Through is a large-scale experimental program in compensatory education. It was implemented through an approach known as "planned variation" which included the systematic introduction of a variety of programs into the kindergarten through third grade years of public education by educational specialists (sponsors) from research institutions and universities who each implemented their own educational model in a group of school districts (sites).

The national evaluation of Follow Through, in which Abt Associates Inc. (AAI) has participated since July, 1972, is designed to examine the effects of different approaches to education for improving the performance of disadvantaged children in a variety of areas. The national evaluations have concentrated on examining data collected from groups of program participants (Cohorts) in each year since 1969. These data include tests administered to children, questionnaires submitted by teachers, and interviews collected from parents.

In a report entitled "Education as Experimentation: A Planned Variation Model. Volume 3" Abt Associates has analyzed data collected on the impact of four years of Follow Through on participants who entered the program in fall, 1970 (Cohort II). As a substudy, AAI has investigated whether attrition of subjects from sites included in the national evaluation has biased the evaluation. It is from this substudy that the data for the current paper has been drawn.

The Sample.

The Cohort II "analytic sample" included a total of 5,519 children (3,369 treatment and 2,152 comparison) distributed across 17 sponsors, where each sponsor implemented its educational program in between one and seven sites and where each site contained a Follow Through treatment group (FT) and a non-Follow Through comparison group (NFT). (See Figure 1.) The overall rate of attrition across all sponsors was 65% -- 61% for FT and 70% for NFT. We have defined attrition to include not only those subjects who dropped out of the program due to mobility, illness, etc., but also those subjects who were not retained in the analytic sample due to missing data, inadequate cell size, etc., or who were dropped from the program for administrative reasons.

FIGURE 1

SPONSOR	SITE	TREATMENT	SUBJECT
SP_1	SI_{11}	FT_{11}	1 ⋮ N
		NFT_{11}	1 ⋮ N
	SI_{12}	FT_{12}	1 ⋮ N
		NFT_{12}	1 ⋮ N
	⋮	⋮	⋮
	SI_{1j}	FT_{1j}	1 ⋮ N
		NFT_{1j}	1 ⋮ N
⋮	⋮	⋮	⋮
SP_i	SI_{i1}	FT_{i1}	1 ⋮ N
		NFT_{i1}	1 ⋮ N
	⋮	⋮	⋮
	SI_{ij}	FT_{ij}	1 ⋮ N
		NFT_{ij}	1 ⋮ N

Method

The data were analyzed in order to answer the following question: for a given sponsor, does the FT/NFT within-site difference in rate of attrition differ across levels of pretest or income? A hierarchical regression analysis was run for each sponsor to predict a dichotomous dependent variable (child was in the analytic sample vs. child not retained). The regression model was as follows:

$$Y = a_0U + b_1X_1 + (b_2X_2 + \ldots + b_iX_i) + (b_{i+1}X_{i+1} + \ldots + b_jX_j)$$

$$+ (b_{j+1}X_{j+1} + \ldots + b_kX_k) + (b_{k+1}X_{k+1} + \ldots + b_LX_L)$$

Where set A is composed of variables X_1 through X_k, set B is composed of variables X_{k+1} through X_L, and variables are defined as follows:

Y = dichotomous dependent variable
- 1 = not retained in analytic sample
- 0 = retained in analytic sample

a_0 = constant

U = unit vector

$b_1 \ldots b_L$ = regression weights for $X_1 \ldots X_L$

X_1 = pretest

$X_2 \ldots X_i$ = (number of sites - 1) orthogonal between-sites Helmert contrasts

$X_{i+1} \ldots X_j$ = (number of sites) orthogonally coded treatment within-site contrasts
- .5 = FT
- -.5 = NFT

$X_{j+1} \ldots X_k$ = interaction of X_1 and $X_2 \ldots X_i$

$X_{k+1} \ldots X_L$ = interaction of X_1 and $X_{i+1} \ldots X_j$

An F test was performed to determine the significance of the incremental variance added by set B, the last set of coefficients in the model ($b_{k+1} \ldots b_L$: the interaction of pretest with treatment within-site). If the overall F test proves non-significant, that is, if the set of interaction variables fails to add "significantly" to R^2 we proceed no further. If, however, the interaction terms (set B) do explain variance in the dependent variable, we examine the individual treatment within-site coefficients for significance.

Results

As can be seen from an examination of Tables I and II, there are few sponsors in which additional variance in the dependent variable is accounted for by the pretest (or income) by treatment within-site sets of variables. In other words, in general, children in the analytic sample are representative of children who started the Follow Through program, at least in terms of pretest and income data. This suggests that the effects of attrition on the Cohort II FT evaluation have been minimal.

For those sponsors in which additional variance is accounted for, the individual within-site terms were tested for significance (.01 level). It should be noted that in no case is more than an additional one percent of the variance in the dependent variable explained by these terms. Those within-site regression lines of attrition rate on pretest and attrition rate on income which were determined to be different for FT and NFT are displayed in Figures 1 and 2. For instance, in Sponsor 4 Site 1, the attrition rate within FT is highest for lower scoring children, while it is relatively constant within NFT. Examination of the other regression lines displayed in Figures 1 and 2 shows that while there are only a few cases of differential attrition, there are several variations on the theme. For these sites the use of pretest and/or income as covariates becomes especially important. To the extent that the assumptions of the analysis of covariance are not met, the internal validity of the evaluation within that site is called into question.

TABLE I

INCREMENT TO R^2 ADDED BY THE PRETEST
BY TREATMENT WITHIN-SITE INTERACTION SET

Sponsor	$R^2_{Y \cdot AB}$	$R^2_{Y \cdot A}$	$R^2_{Y \cdot AB} - R^2_{Y \cdot A}$
01	.025	.006	.019
02	.013	.013	.000
03	.088	.088	.000
04	.081	.059	.022*
05	.049	.048	.001
06	.065	.064	.001
07	.102	.100	.002
08	.143	.134	.009*
09	.054	.045	.009*
10	.150	.149	.001
11	.036	.032	.004
12	.141	.140	.001
13	.133	.132	.001
14	.006	.005	.001
15	.265	.260	.005*
16	.006	.005	.001
17	.077	.073	.004

* $p < .01$

TABLE II

INCREMENT TO R^2 ADDED BY THE INCOME
BY TREATMENT WITHIN SITE INTERACTION SET

Sponsor	$R^2_{Y \cdot AB}$	$R^2_{Y \cdot A}$	$R^2_{Y \cdot AB} - R^2_{Y \cdot A}$
01	.044	.043	.001
02	.014	.010	.004
03	.074	.074	.000
04	.087	.086	.001
05	.041	.038	.003
06	.073	.070	.003
07	.101	.100	.001
08	.129	.125	.004
09	.037	.031	.006
10	.146	.137	.009*
11	.043	.039	.004
12	.128	.127	.001
13	.129	.123	.006*
14	.004	.002	.002
15	.254	.250	.004
16	.014	.006	.008*
17	.080	.078	.002

* $p < .01$

Figure 1

Regression Lines of Attrition Rate on Pretest for FT and NFT Groups in the Sites where the Pretest by Treatment Within-Site Regression Coefficient is Statistically Significant at the .01 Level

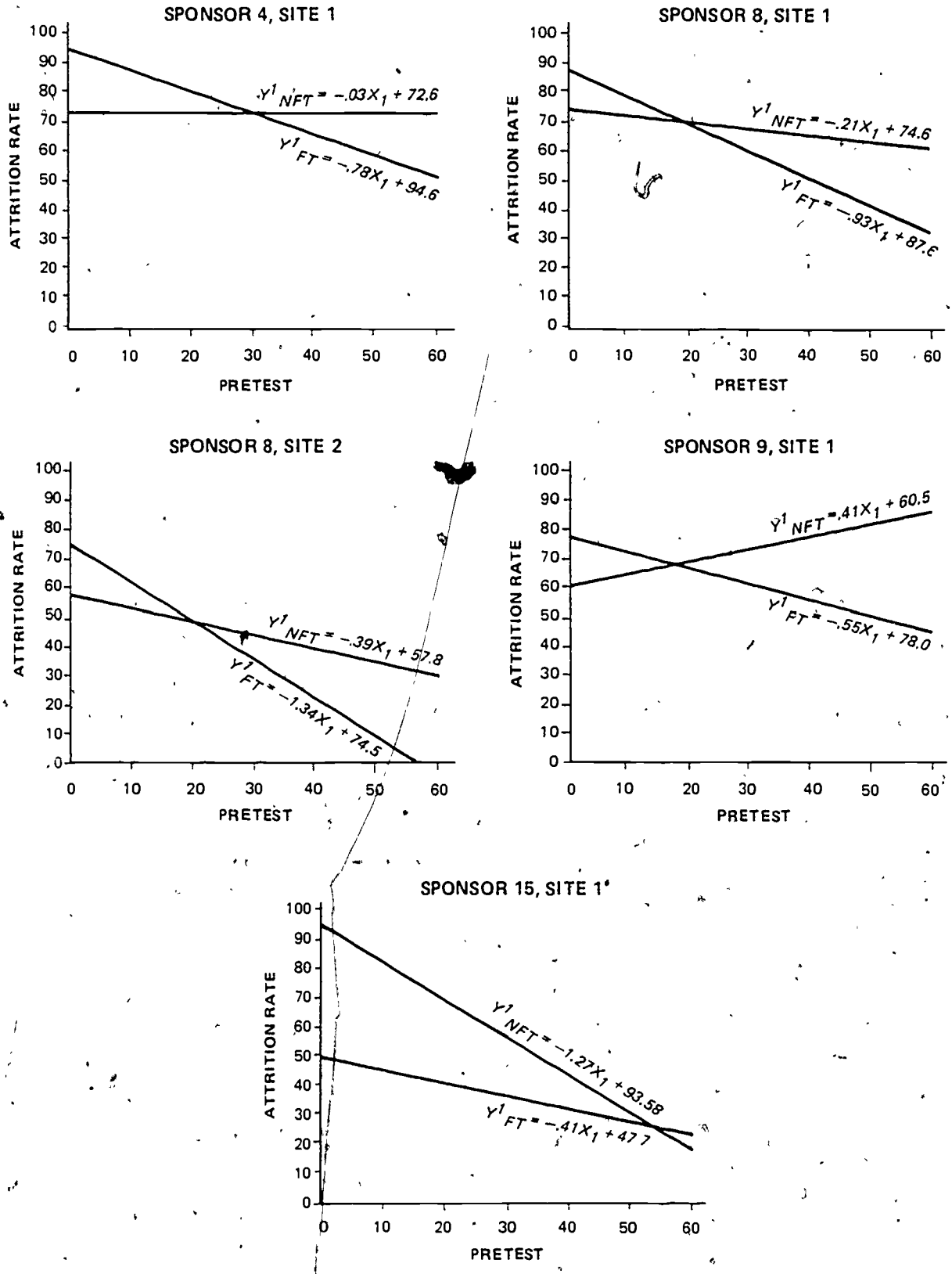
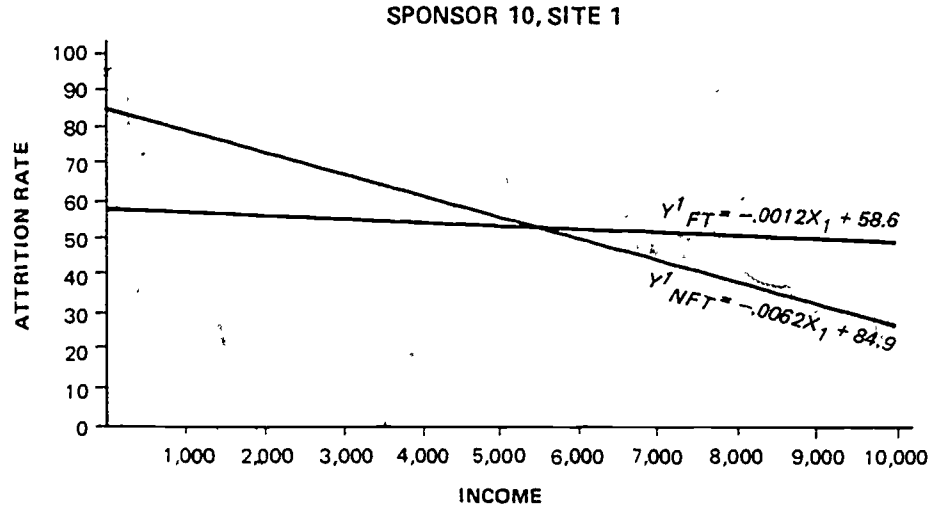
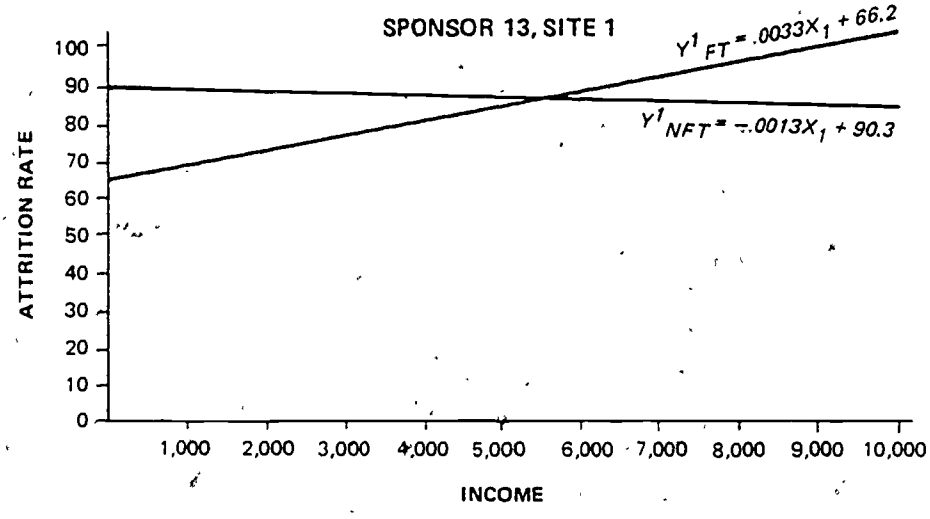
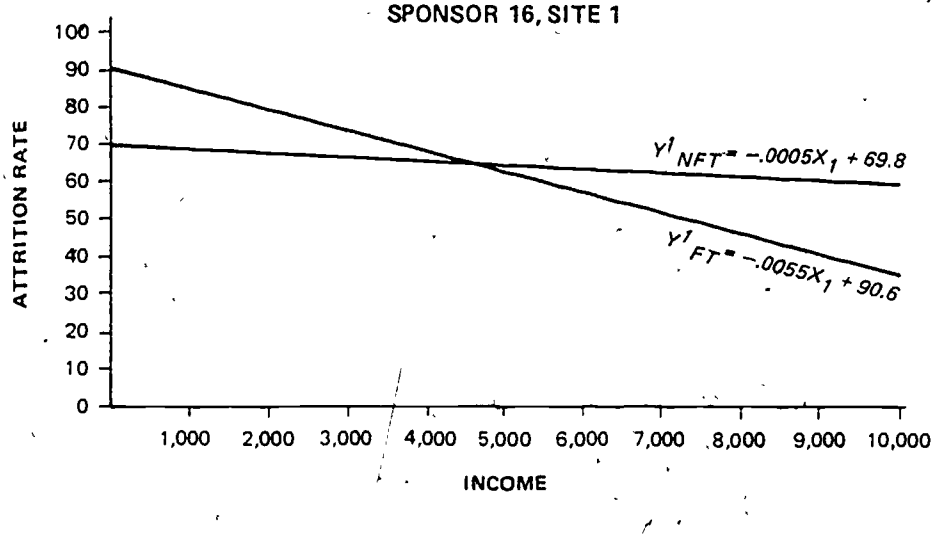


Figure 2

Regression Lines of Attrition Rate on Income for FT and NFT Groups in Sites where the Pretest by Treatment Within-Site Regression Coefficient is Statistically Significant at the .01 Level







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